

CLAIMS

What is claimed is:

1. A high-throughput screening method, comprising the steps of:
 - (A) sequentially loading a plurality of discrete combinations of reactants into a longitudinal reaction zone;
 - 5 (B) reacting each of said plurality of combinations as each combinations passes through said reaction zone to provide a continuously or an incrementally varying reaction product; and
 - (C) sequentially discharging the reaction product of each of said combinations from said reaction zone as reaction of each of said combinations is completed.
- 10 2. The method of claim 1, wherein the discrete combinations of reactants vary in identity or amount.
- 15 3. The method of claim 1, wherein step (B) comprises subjecting each sequentially loaded combination to a varying reaction parameter within said zone.
4. The method of claim 1, wherein each combination of reactants is loaded in a vial prior to step (A).
- 20 5. The method of claim 1, wherein said combinations of reactants are suspended in a vapor stream.
6. The method of claim 2, further comprising the steps of:
 - (D) detecting said varying products and
 - (E) correlating said products with said varying reactants to provide a nonrandom combinatorial library of product.

7. The method of claim 3, further comprising the steps of:
(D) detecting said varying products and
(E) correlating said products with said varying reaction parameters to provide a nonrandom combinatorial library of product.

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8 The method of claim 1, further comprising sequentially loading said combinations into an air lock, sealing said air lock and pressurizing said air lock to a pressure substantially equal to a pressure in said reaction zone prior to loading said combinations according to step (A).

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9. The method of claim 1, further comprising sealing an air lock prior to discharge of said reaction product according to said step (C); discharging said reaction product from said reaction zone to said air lock; sealing said air lock from said reaction zone; releasing pressure in said air lock; and discharging said reaction product from said air lock.

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10. The method of claim 1, wherein said combinations of reactants are at least partially embodied in a liquid, said liquid being contacted within said longitudinal reaction zone with a second reactant at least partially embodied in a gas, the second reactant having a mass transfer rate into the liquid sufficient to allow a reaction rate that is essentially independent of said mass transfer rate.

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11. The method of claim 10, wherein said each combination of reactants includes a catalyst system comprising a Group VIII B metal.

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12. The method of claim 11, wherein the Group VIII B metal is palladium.

13. The method of claim 11, wherein the catalyst system further comprises a halide composition.

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14. The method of claim 11, wherein the catalyst system further comprises an inorganic co-catalyst.
- 5 15. The method of claim 14, wherein the catalyst system further comprises a combination of inorganic co-catalysts.
- 10 16. A combinatorial chemical synthesis system, comprising a vessel having a charge port adapted to sequentially receive a plurality of discrete combinations of reactants; a reaction chamber in communication with said charge port and adapted to receive and enclose the plurality of discrete combinations of reactants disposed linearly within said chamber; and a discharge port in communication with said reaction chamber to sequentially discharge reaction products of said combinations from said reaction chamber.
- 15 17. The system of claim 16, wherein said reaction chamber is sized to receive a plurality of vials sequentially charged through said charge port and into said chamber.
- 20 18. The system of claim 16, wherein said charge port and said discharge port each comprises an air lock.
- 25 19. The system of claim 16, wherein said charge port and said discharge port each comprises an air lock controlled by a ball valve.
- 20 20. The system of claim 16, wherein said chamber is a vertically longitudinal reaction zone adapted to receive each of said combinations of reactants in a vial by sequential gravity loading from the charge port.
- 30 21. The system of claim 16, further comprising a detector proximate said discharge port to detect said sequentially discharged reaction product from said reaction chamber.

22. The system of claim 16, further comprising a controller in communication with said reaction vessel to control varying reaction parameters within said chamber.

5 23. The system of claim 16, further comprising a controller in communication with said reaction vessel to control a sequence of charging said combinations of reactants to said chamber or a sequence of discharging said products from said chamber.

10 24. The system of claim 16, further comprising a detector in communication with said discharge port to detect said sequentially discharged reaction products and a processor in communication with said controller and said detector to correlate reaction or reactant variables with a corresponding reaction product.

15 25. A combinatorial chemical synthesis system, comprising a vessel having a charge port comprising an air lock controlled by a ball valve and adapted to sequentially receive a plurality of discrete combinations of reactants; a reaction chamber in communication with said charge port and adapted to receive and enclose the plurality of discrete combinations of reactants disposed linearly within said chamber; a discharge port comprising an air lock controlled by a ball valve to sequentially discharge reaction products of said combinations from said reaction chamber; and a controller in communication with said reaction vessel, to control varying reaction parameters within said chamber.

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